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Hammond

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(45) **Date of Patent: *Jun. 14, 2011**

(54) **FORK CROWN SUPPORTED BICYCLE CARRIER**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 403 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/453,095**

(22) Filed: **Jun. 15, 2006**

(65) **Prior Publication Data**

US 2006/0237505 A1 Oct. 26, 2006

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/782,174, filed on Feb. 20, 2004.

(51) **Int. Cl.**
B60R 11/00 (2006.01)
B60R 9/00 (2006.01)

(52) **U.S. Cl.** **224/521**; 224/924

(58) **Field of Classification Search** 224/488, 224/495, 509, 518–521, 532, 924; 211/17–22
See application file for complete search history.

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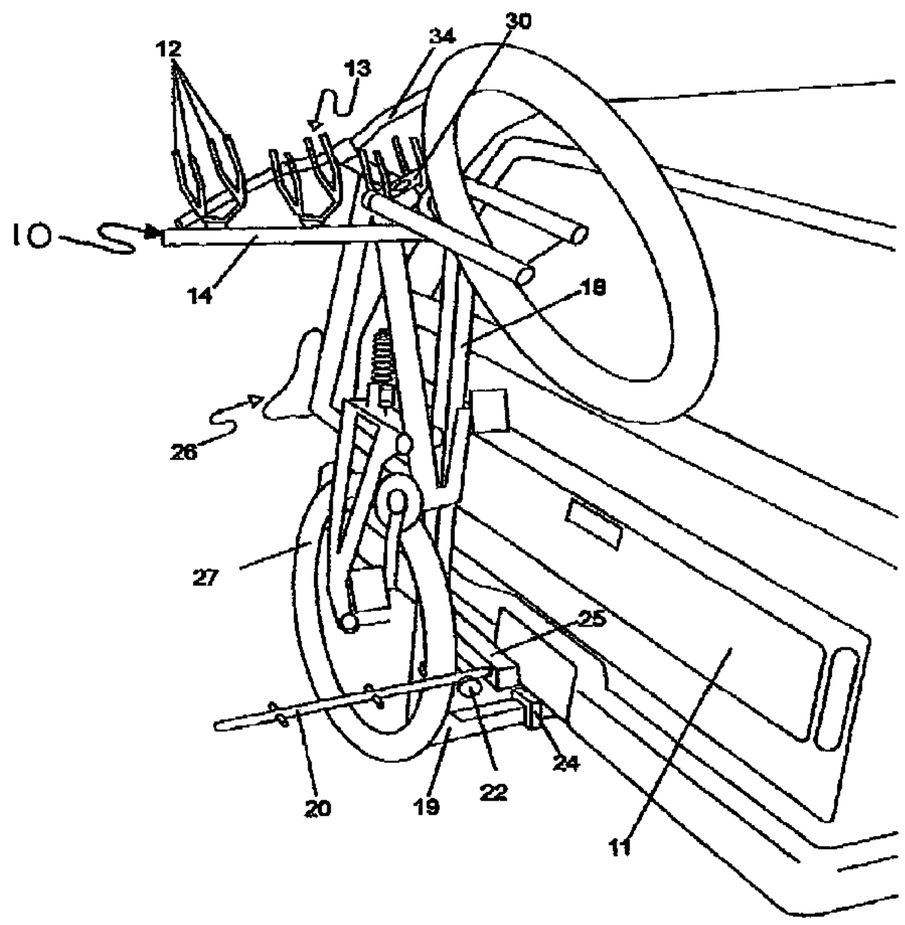
(57) **ABSTRACT**

A vehicle mounted bicycle carrier for transporting non-standard bicycle frame types, such as full suspension mountain bikes. The carrier typically is mounted to the hitch structure of a vehicle and is comprised of a vertical support mast, with a top mounted horizontal bar, containing cradles for hanging bicycles from their fork crowns in a vertical position, providing independent access. The cradle design turns the fork and handlebars to a degree that prevents interference with an adjacent bicycle's handlebars, thereby allowing the closest possible spacing. Lower down on the vertical support mast is a horizontal bar for securing the bicycle rear wheels, preventing the bicycles from swinging freely on the cradles.

13 Claims, 11 Drawing Sheets



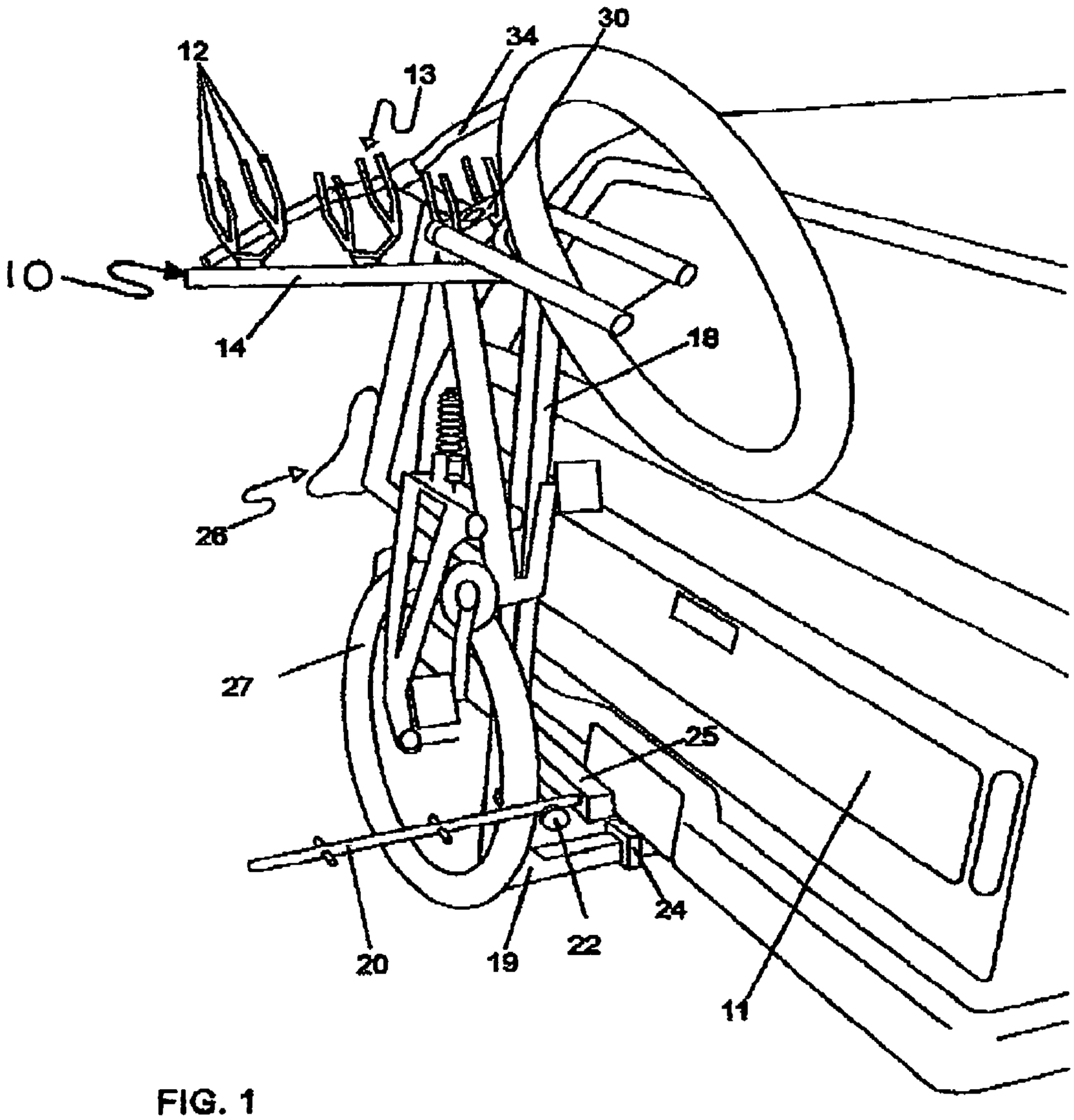


FIG. 1

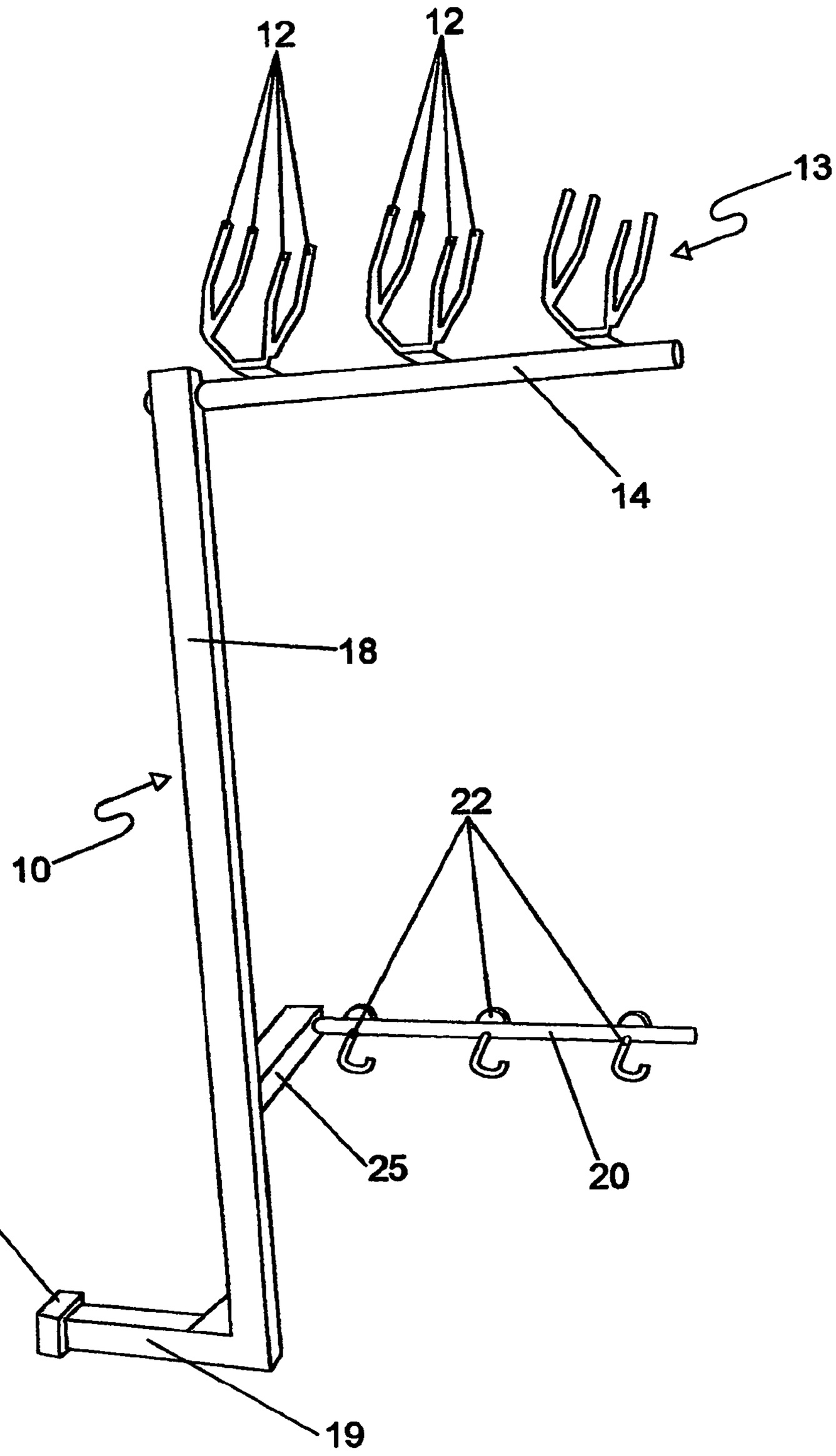


FIG. 2

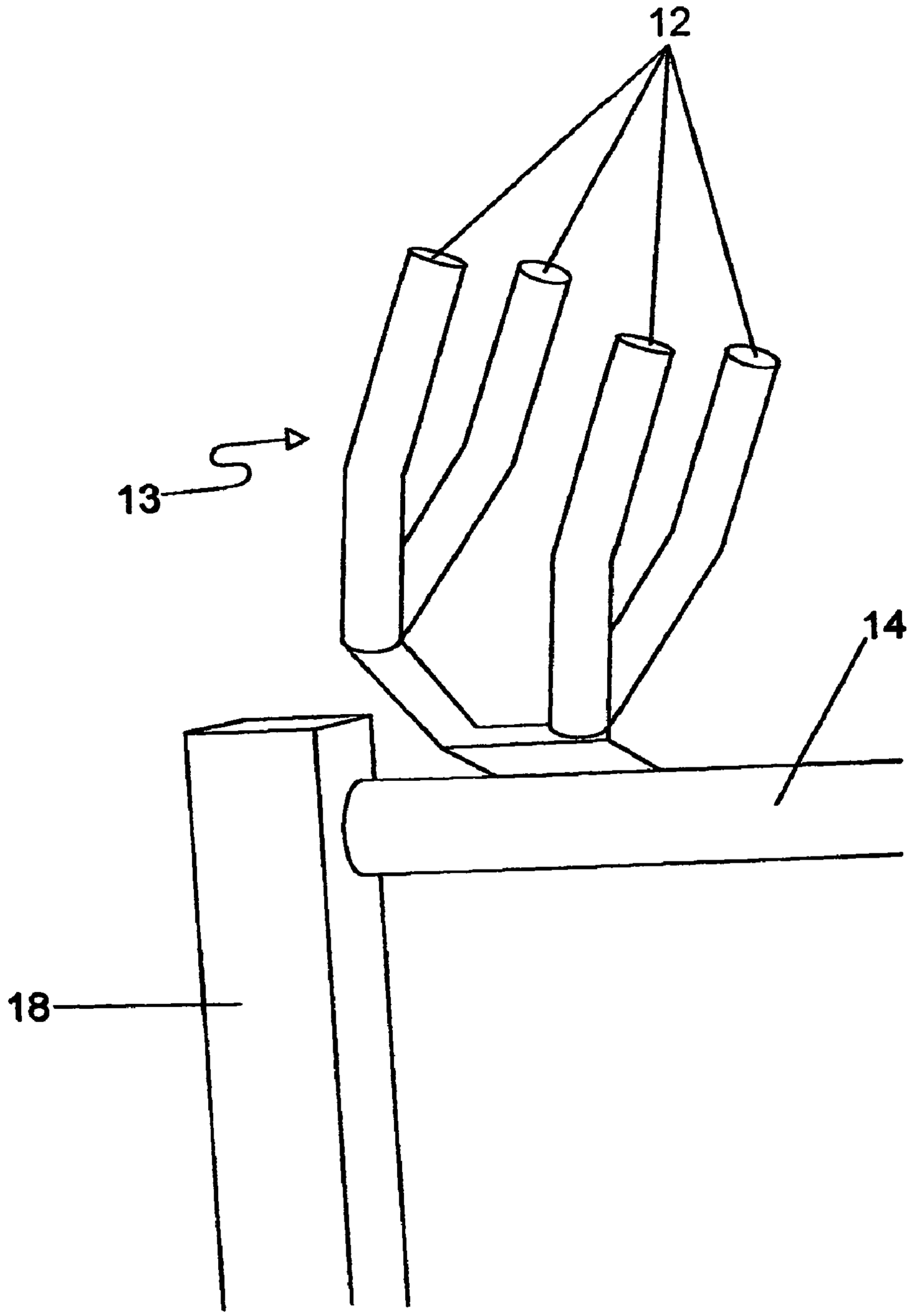


FIG. 3

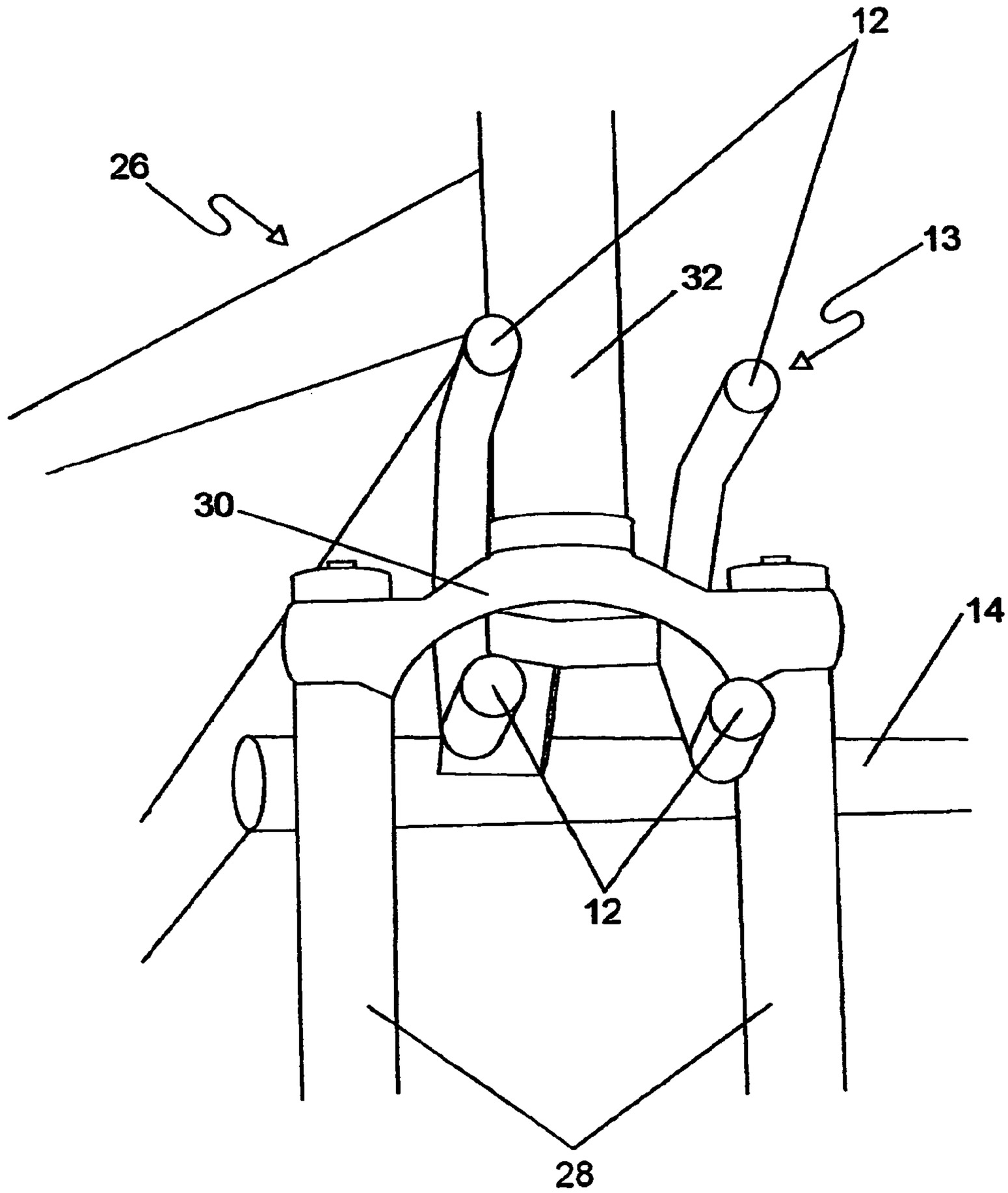


FIG. 4

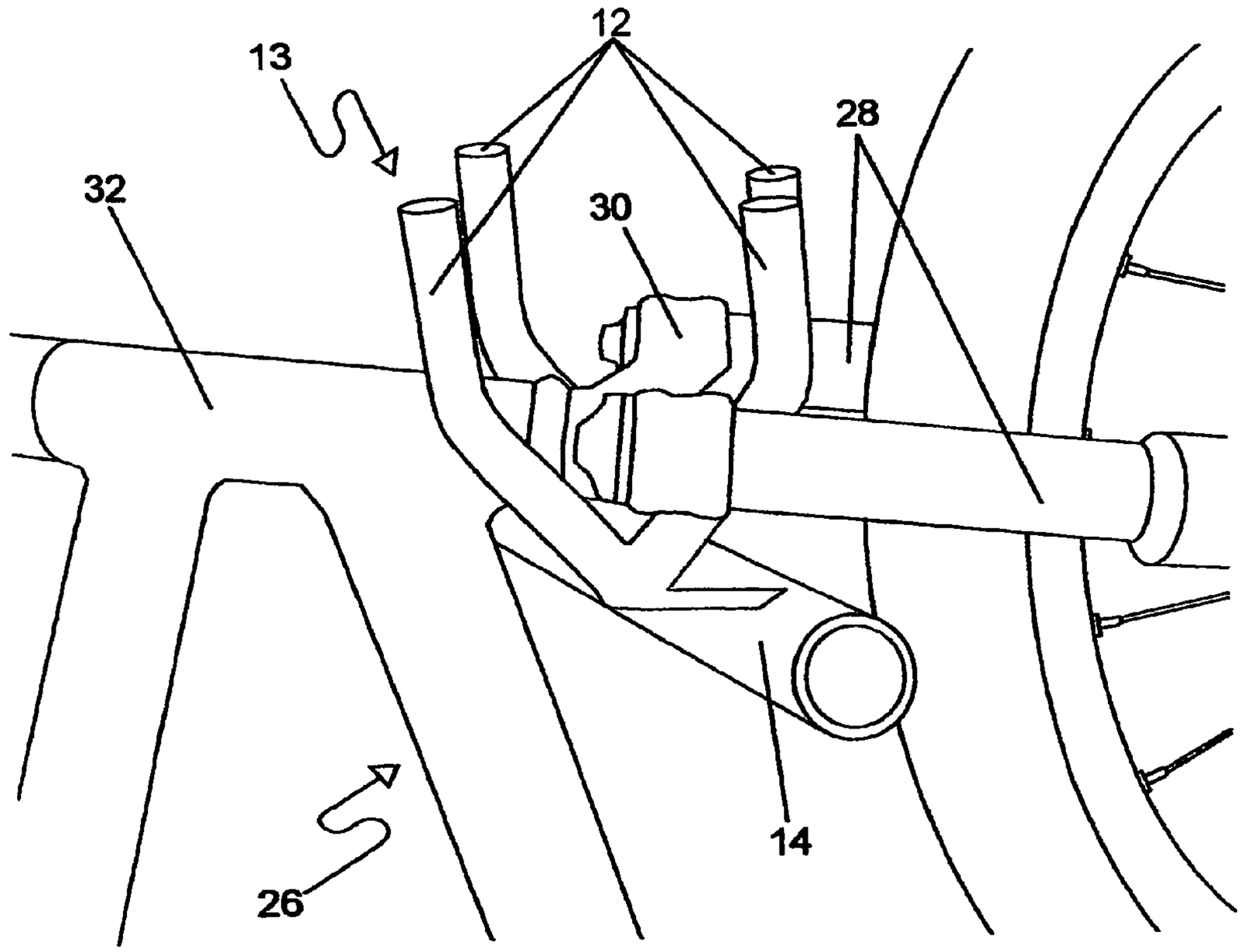


FIG. 5

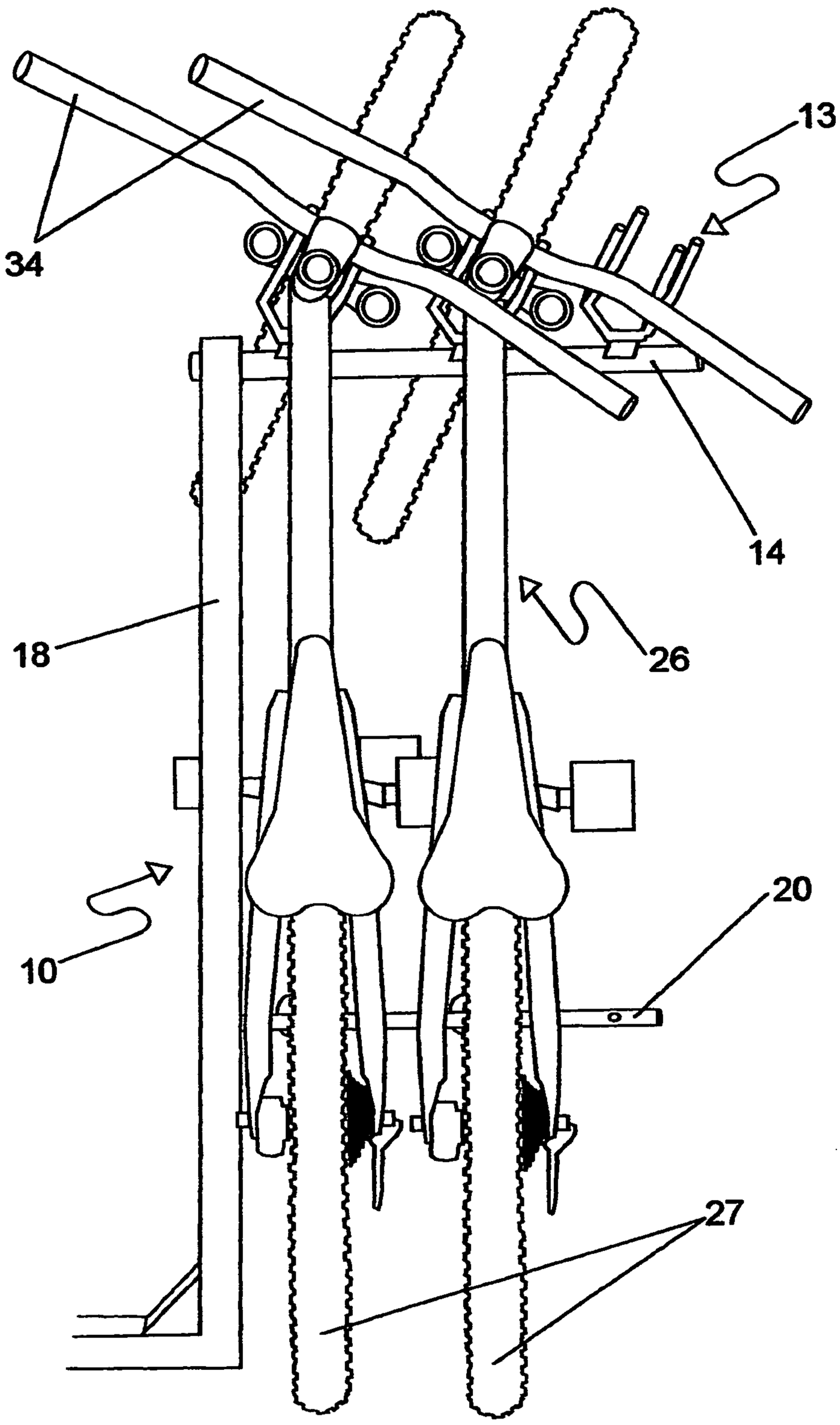


FIG. 6

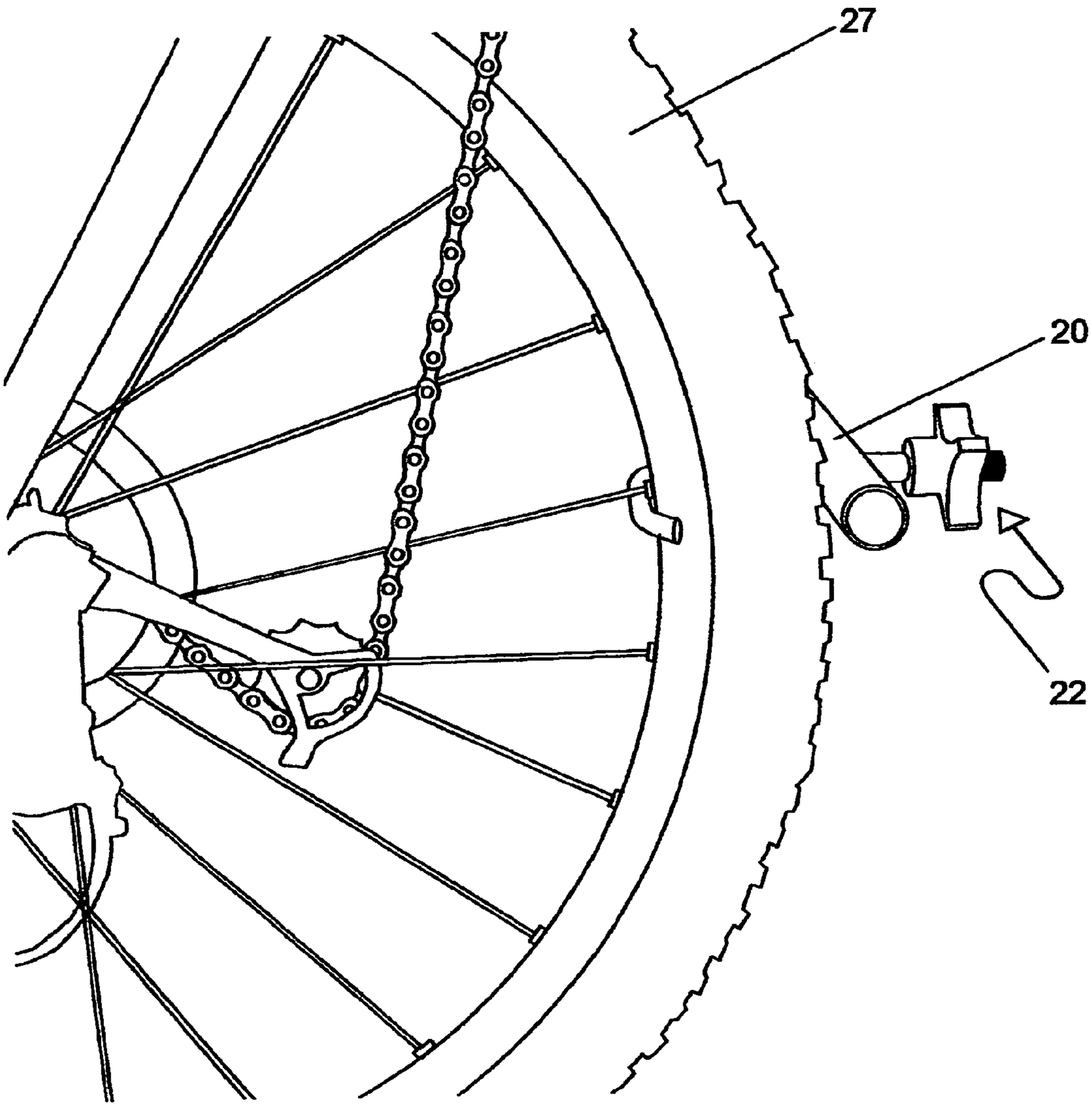


FIG. 7

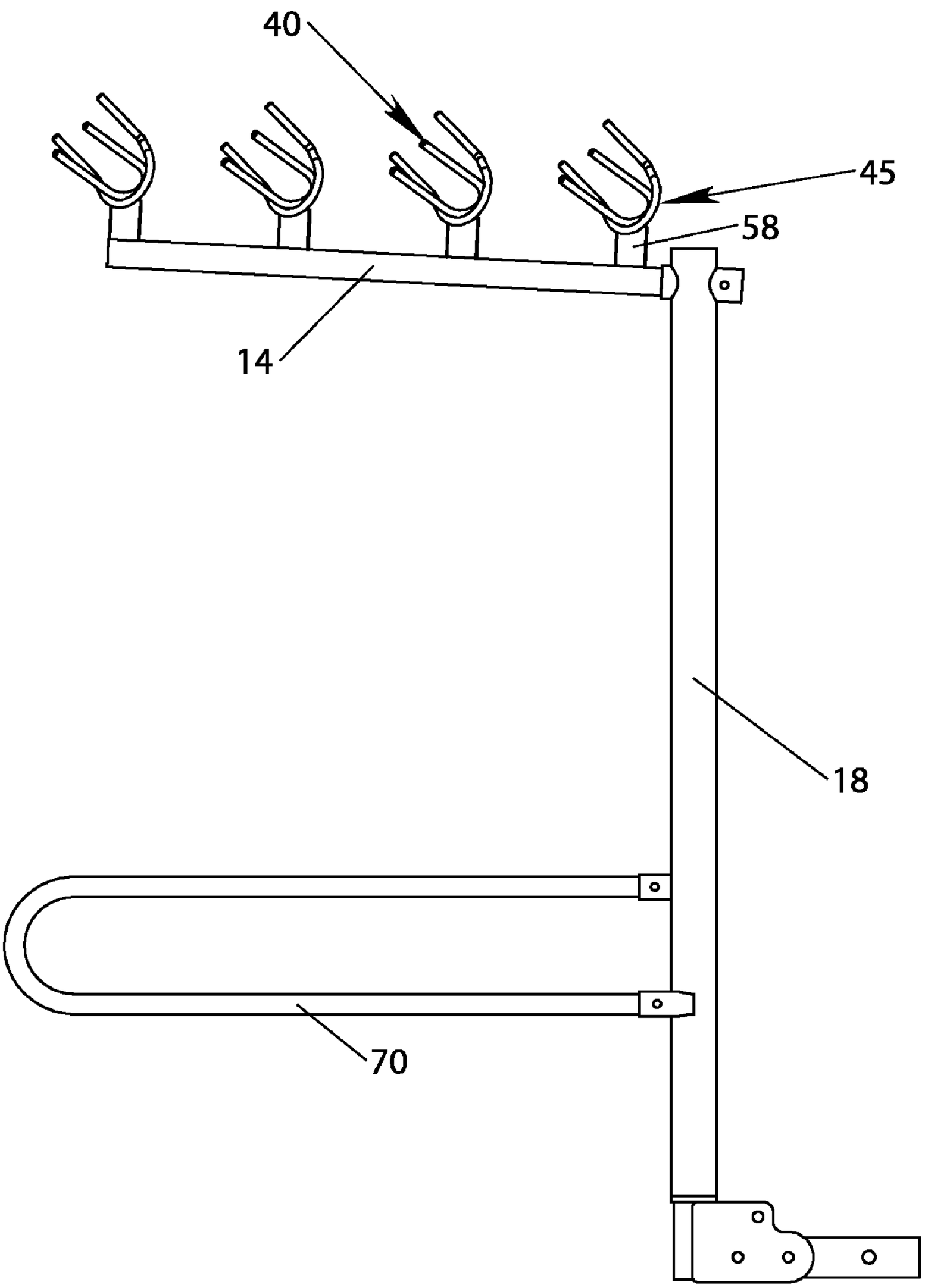


FIG. 8

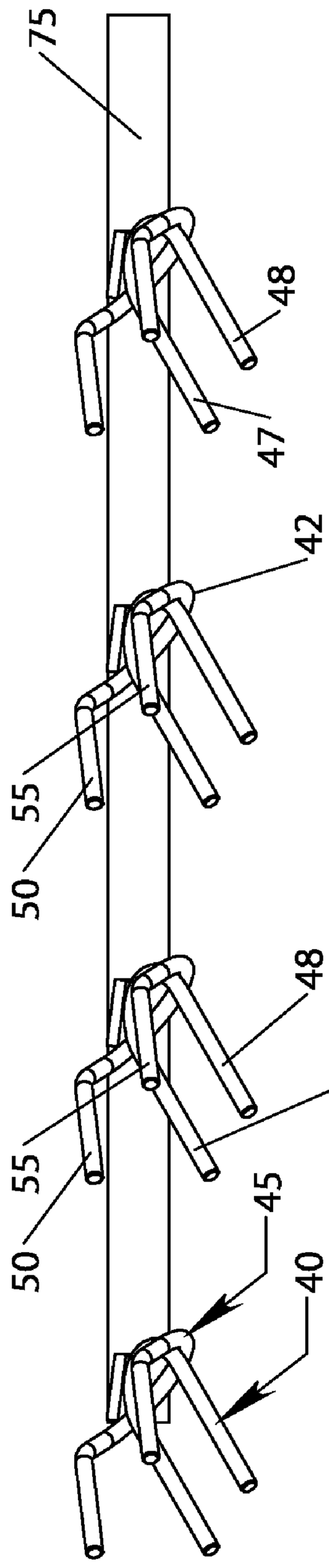


FIG. 9

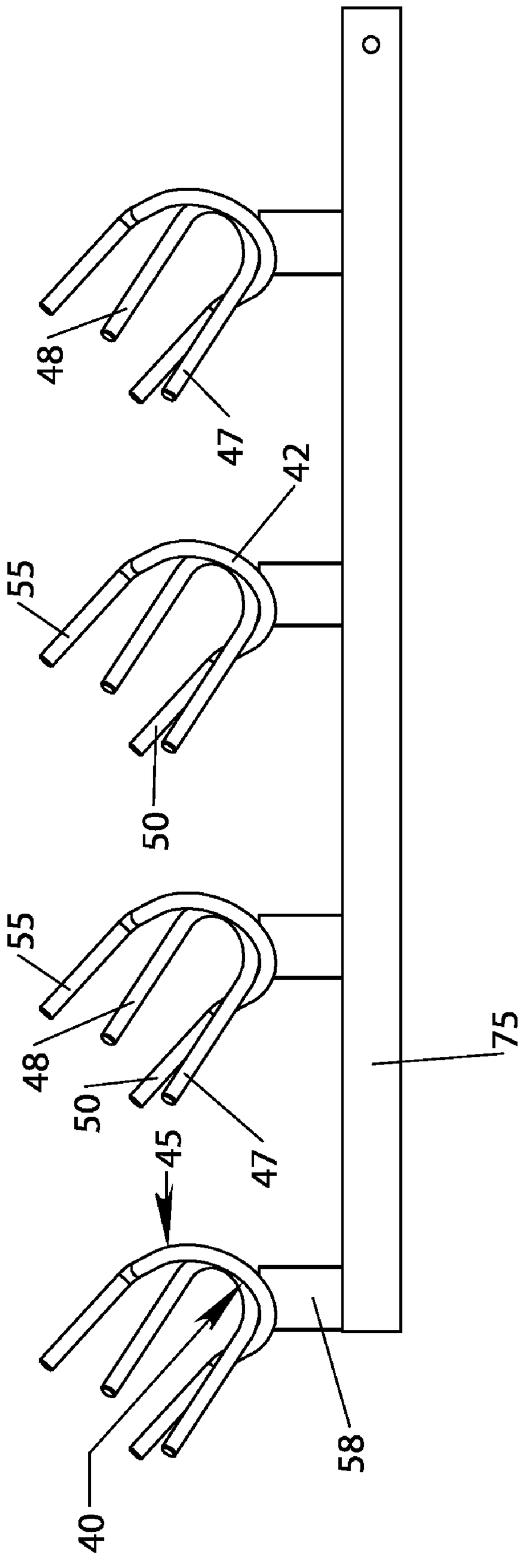


FIG. 10

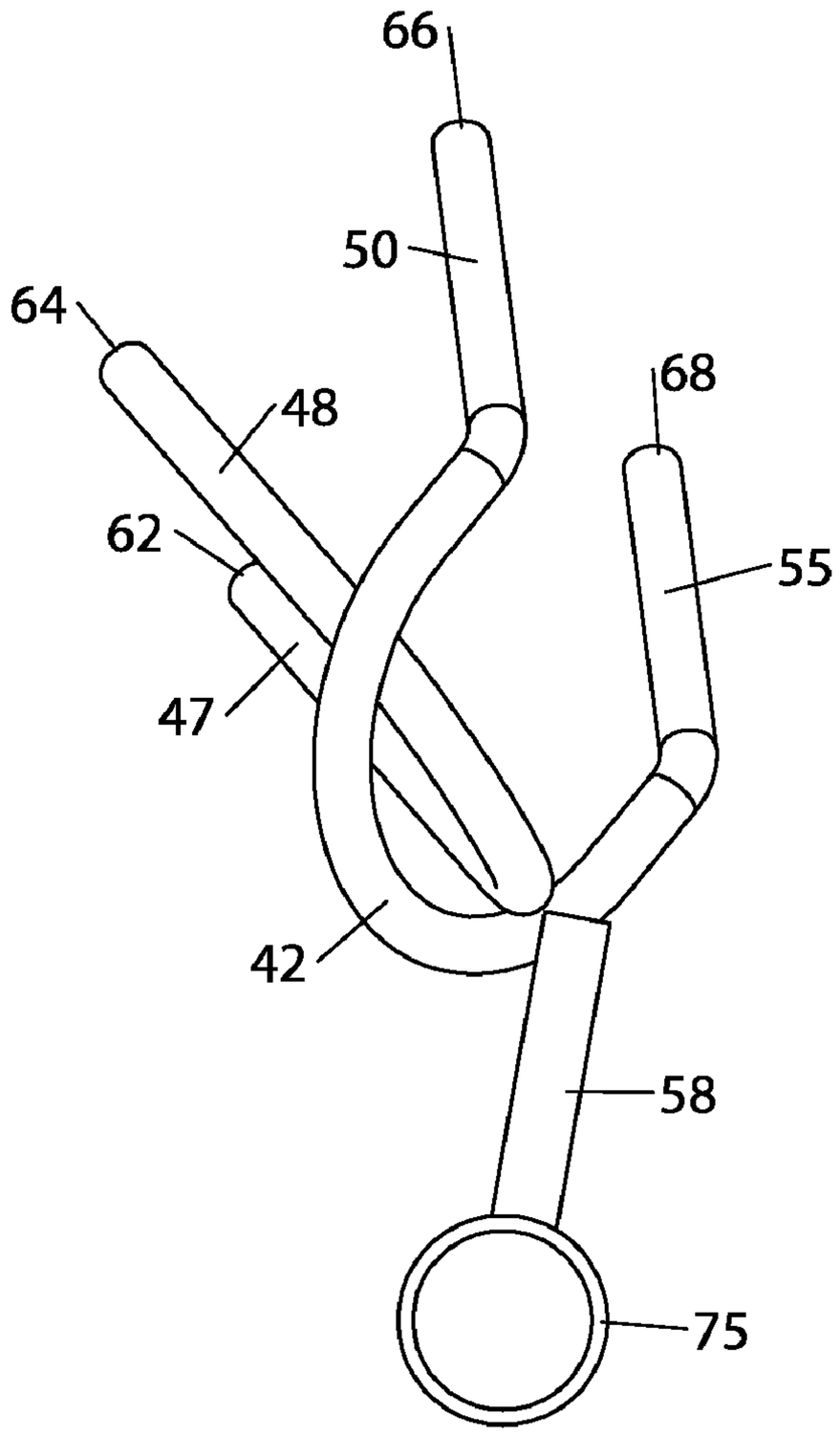


FIG. 11

FORK CROWN SUPPORTED BICYCLE CARRIER

This application is a continuation-in-part of U.S. patent application Ser. No. 10/782,174 filed Feb. 20, 2004.

FIELD OF THE INVENTION

The present invention relates to a bicycle carrier, and particularly to a vehicle mounted bicycle carrier.

BACKGROUND OF THE INVENTION

Bicycles are often transported between locations on carriers attached to vehicles. In many cases, these carriers incorporate an arm or cradle that the top tube of a bicycle rests on or in, to support the bicycle. However, women's bicycles and many newer non-traditional frames, especially full suspension mountain bikes, do not have a top tube. As a result, these types of bicycles cannot be directly mounted on such carriers.

Several bicycle carrier designs aim to overcome this problem. One such design places the bicycle on top of the vehicle by removing the front wheel of the bicycle and clamping the carrier to the exposed ends of the bicycle fork. Problems with this design include the hassle associated with removing the front wheel, and the need to store the wheel elsewhere. Also the bicycle needs to be lifted up high and placed on top of the vehicle. Another carrier design incorporates a surrogate top tube, as disclosed in Hilk, U.S. Pat. No. 6,435,523, issued Aug. 20, 2002, whereby a tube is attached to the handlebars and seat post of a bicycle and the bicycle and attached tube is then affixed to the bicycle carrier. This design requires the user to attach the device to the bicycle in two different places, and then to attach the device to the bicycle carrier, adding greatly to the amount of time needed to attach the bicycle to the vehicle. Yet other carrier designs carry a bicycle behind a vehicle via cradles in which the bicycle wheels sit. This style of bicycle carrier is generally large, complicated, and cumbersome, especially those which carry a plurality of bicycles. Another common design of hitch mounted bicycle carriers simply stack the bicycles on a fork or similar structure, requiring the removal of the outermost bicycles to access the innermost bicycles.

SUMMARY OF THE INVENTION

Several objects and advantages of the present invention include:

a) providing a vehicle mountable bicycle carrier capable of carrying any bicycle regardless of its frame design;

b) providing a vehicle mountable bicycle carrier which is easy to use;

c) providing a vehicle mountable bicycle carrier which carries one or more bicycles without removing any part of any bicycle;

d) providing a vehicle mountable bicycle carrier which carries a plurality of bicycles and does not require the removal of any bicycle to access another bicycle; and

e) providing a vehicle mountable bicycle carrier which is not overly complex and cumbersome.

The present invention provides a vehicle hitch mountable bicycle carrier comprising an upper bar containing cradles made up of paired V shaped tines, in which the crown of a bicycle fork fits. The bicycle hangs from its fork crown in a near vertical orientation, hooked by a cradle on the carrier's upper bar. Furthermore, the cradles are orientated such that the bicycle's front wheel and handlebars are turned to facilitate the close proximity of another bicycle. The rear wheel is affixed to the carrier's lower bar by a hook or other device.

DRAWINGS

FIG. **1** is a perspective view of the end of a vehicle with a bicycle carrier according to the invention, having a bicycle mounted thereon;

FIG. **2** is a perspective side view of the bicycle carrier thereof;

FIG. **3** is a perspective side view of a fork crown cradle the upper bar thereof;

FIG. **4** is a perspective top view of the fork crown cradle thereof, showing the cradle to bicycle fork crown interface;

FIG. **5** is an end view of a fork crown cradle showing the interface of a bicycle fork crown and the cradle;

FIG. **6** is a side view of the bicycle carrier showing how the angled mounting of the bicycle handlebars facilitates the close proximity of the bicycles;

FIG. **7** is a side view of a bicycle rear wheel secured to the rear wheel stabilizer bar of the bicycle carrier by a J-hook and knob device;

FIG. **8** is a perspective view of an alternative embodiment of a bicycle carrier according to the invention;

FIG. **9** is a top view of the upper bar and cradle thereof;

FIG. **10** is a side view thereof; and

FIG. **11** is an end view thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings, the following numerals represent the following components:

Reference Numeral	Component
10	bicycle carrier
11	vehicle
12	tines
13	fork crown cradle
14	horizontal upper bar
18	vertical support mast
19	hitch attachment bar
20	rear wheel horizontal stabilizer bar
22	J-hook and knob
24	vehicle hitch structure
25	stabilizer offset tube
26	bicycle
27	bicycle rear wheel
28	bicycle fork tubes
30	bicycle fork crown
32	bicycle head tube
34	handlebars
40	inside tine
42	tine base
45	outside tine
47	tine arm
48	tine arm
50	raised arm
55	raised arm
58	attachment member
62	free distal end
64	free distal end
66	free distal end
68	free distal end
70	support member
75	upper horizontal bar

Referring to FIG. **1**, the bicycle carrier **10** according to the invention is shown mounted to the rear of a vehicle **11** for the convenient transport of at least one bicycle **26**. In a preferred

embodiment bicycle carrier **10** is attached to vehicle **11** through hitch structure **24** substantially mounted to vehicle **11**. Bicycles **26** are securable to bicycle carrier **10** for transport by vehicle **11** and subsequent removal and use at the destination.

FIG. **2** shows bicycle carrier **10** attached to vehicle hitch structure **24**. The preferred embodiment of bicycle carrier **10** has a horizontal upper bar **14** with a plurality of cradles (referred to herein as fork crown cradles **13**), attached to horizontal upper bar **14**. In a preferred embodiment, each fork crown cradle **13**, as shown in FIG. **3**, is comprised of four tines **12** approximately five inches in length, arranged into two V-shaped structures, with a V angle of approximately seventy degrees, spaced approximately four inches apart, and with about the top half of tines **12** being parallel. The fork crown cradles **13** can be set at an angle between zero and ninety degrees from the longitudinal axis of the horizontal upper bar **14**.

In the embodiment shown in FIG. **1** and FIG. **2** the fork crown cradles **13** are at an angle of approximately forty-five degrees from the longitudinal axis of the horizontal upper bar **14**. Each fork crown cradle **13** is spaced at a distance from an adjacent fork crown cradle **13** to allow the closest possible proximity of another bicycle, about seven inches in a preferred embodiment. The horizontal upper bar **14**, best shown in FIG. **2**, is attached to vertical support mast **18**, and the lowermost end of vertical support mast **18** is affixed to hitch attachment bar **19**. Hitch attachment bar **19** is simply slid into a receiver style vehicle hitch structure **24**, thereby positioning horizontal upper bar **14** at an approximate right angle to the bumper of vehicle **11**.

Other means of attaching bicycle carrier **10** to vehicle **11** are available, including the use of a strap system (possibly in combination with hooks) or by connecting bicycle carrier **10** to a roof mount.

At a point on vertical support mast **18** located approximately one bicycle wheelbase length down from horizontal upper bar **14**, is rear wheel horizontal stabilizer bar **20**. Preferably, rear wheel horizontal stabilizer bar **20** is offset to the right by approximately one half of a bicycle wheel diameter, as viewed from behind, by stabilizer offset tube **25**. Spaced approximately equidistant on rear wheel stabilizer bar **20** and centered with respect to fork crown cradles **13** on the horizontal upper bar **14**, are J-hook and knob devices **22**. The J-hook and knob devices **22** are simply hooks with threads and a knob on the non-hooked end, which pass through holes in the rear wheel stabilizer bar **20**, and are used to secure a bicycle rear wheel, as seen in FIG. **7**.

FIG. **3**, FIG. **4** and FIG. **5** are views of a fork crown cradle **13** comprised of one pair of V shaped paired tines **12**. FIG. **4** is an overhead view of one fork crown cradle **13**, showing the bicycle fork crown **30** and the bicycle head tube **32**, contained within the fork crown cradle **13** and showing the bicycle fork tubes **28** running outboard of the tines **12**, and the bicycle head tube **32** running inboard of the tines **12**. As viewed in FIG. **5**, the bicycle fork crown **30** is placed between the two leftmost and two rightmost tines **12**.

As shown in FIG. **6** the close mounting of adjacent bicycles **26** is facilitated by the fork crown cradles **13** being set at an angle of approximately forty-five degrees from the horizontal upper bar **14**. This angle inherently turns the bicycle fork and most importantly the handlebars **34** to approximately the same angle, thereby eliminating interference with another bicycle's handlebars, mounted to an adjacent fork crown cradle **13**.

FIG. **7** shows how the rear wheel of the bicycle **27** is secured against the rear wheel stabilizer bar **20** by a J-hook and knob device **22**. This device consists of a hooked metal rod mounted through a hole in the rear wheel stabilizer bar **20**. The straight end is threaded with a knob attached. The rear wheel of the bicycle is simply hooked by the J-hook and tightened against the rear wheel stabilizer bar **20** by the knob.

Alternative embodiments of fork crown cradle and tines may be used in association with the invention. For example, in an alternative embodiment of the invention, as seen in FIGS. **8**, **9**, **10** and **11**, each pair of tines **40** and **45** is interlayer. As seen in FIG. **10**, inside tine pair **40** forms a U shape and is secured to attachment member **58** such that lower arm **47** of inside tine pair **40** is at an approximate forty-five degree angle to horizontal upper bar **14**.

In the alternative embodiment, raised arms **50**, **55** of outside tine pair **45** are positioned adjacent to, but outside arms **47**, **48** of inside tine pair **40**. Outside tine pair **45** includes a U shaped base **42**, and raised arms **50**, **55**. U shaped base **42** is secured to lower arm **47**. Each of the arms **47**, **48**, **50** and **55** has a corresponding free distal end **62**, **64**, **66** and **68**. The tine arrangement of the alternative embodiment is structurally simple and operates in the same manner as fork crown cradle **13** and are compatible with most styles of bicycle forks. They also may be simpler to manufacture than the tines of the earlier described embodiment.

In the alternative embodiment, as seen in FIG. **8**, a generally U shaped support member **70** extends horizontally from support mast **18** and meets support mast **18** at two points. Support member **70**, when in use, prevents the rear wheel **27** of bicycle **26** from riding up and over upper horizontal bar **75** thereby preventing bicycle **26** from moving upwards and off tines **40**, **45**. The upper horizontal bar **75** of support member **70** functions in a similar manner as a wheel chock.

The reader will see that the bicycle carrier of this invention can be used to transport, by vehicle, any bicycle with a front fork, encompassing virtually all known bicycle designs. The carrier design allows the quick and convenient loading and unloading of bicycles, without the need to remove any bicycle to access another. Furthermore the design provides an efficient way to carry as many bicycles as possible, in as little space as possible, by turning the handlebars, thereby preventing interference.

I claim:

1. A bicycle carrier for receiving a fork crown of a bicycle, the bicycle carrier comprising:

a support mast;

a hitch attachment bar extending generally perpendicular from the support mast adjacent a first end thereof;

an elongate support member extending generally perpendicular from the support mast adjacent a second end thereof;

a substantially U-shaped support member extending generally perpendicular from the support mast and generally parallel to the elongate support member, the U-shaped support member being disposed between the hitch attachment bar and the elongate support member, and the U-shaped member being positioned and configured to stabilize a rear wheel of the bicycle by functioning as a wheel chock to prevent the rear wheel from riding over the U-shaped support; and

a cradle disposed along the elongate support member, the cradle including four rods, wherein each of the rods extends away from the elongate support member and said each of the rods has a free distal end, a first pair of the rods forming a U-shape structure and a second pair of the rods forming a U-shaped base from which the rods thereof further extend angularly as arms towards the distal end of the said rods the second pair of rods being

connected to and extending from at least one rod of the first pair of rods so as to allow the fork crown to be received between the first pair of rods, whereby the first pair of rods is disposed between fork tubes of the bicycle and a head tube of the bicycle is disposed between the second pair of rods.

2. A bicycle carrier as claimed in claim **1** wherein the arms are parallel.

3. A bicycle carrier as claimed in claim **1** wherein the arms are disposed adjacent to but outside the first pair of rods.

4. A bicycle carrier as claimed in claim **1** further including an attachment member extending between the elongate support member and the first pair of rods.

5. A bicycle carrier as claimed in claim in **1** wherein at least one rod of the first pair of rods extends at a forty-five degree angle relative to elongate support member.

6. A bicycle carrier as claimed in claim **1** further including a plurality of cradles disposed along the elongate support member.

7. A bicycle carrier as claimed in claim **1** wherein the U-shaped support member is connected to the support mast at two points.

8. A bicycle carrier having a support mast, an elongate support member extending from the support mast and cradle disposed along the elongate support member, the cradle being for receiving a crown fork of a bicycle and the cradle comprising:

a first pair of rods forming a U-shape structure; and

a second pair of rods forming a U-shaped base from which the rods thereof further extend angularly as arms towards the distal end of the said rods;

wherein each of the rods extends away from the elongate support member and each of the rods has a free distal end, the second pair of rods being connected to and extending from at least one rod of the first pair of rods so as to allow the fork crown to be received between the first pair of rods, whereby the first pair of rods is disposed between fork tubes of the bicycle and a head tube of the bicycle is disposed between the second pair of rods.

9. A bicycle carrier as claimed in claim **8** wherein the arms are parallel.

10. A bicycle carrier as claimed in claim **8** wherein the arms are disposed adjacent to but outside the first pair of rods.

11. A bicycle carrier as claimed in claim **8** further including an attachment member extending between the elongate support member and the first pair of rods.

12. A bicycle carrier as claimed in claim in **8** wherein at least one tine of the first pair of rods extends at a forty-five degree angle relative to elongate support member.

13. A bicycle carrier for receiving a fork crown of a bicycle, the bicycle carrier comprising:

a support mast;

a hitch attachment bar extending generally perpendicular from the support mast adjacent a first end thereof;

an elongate support member extending generally perpendicular from the support mast adjacent a second end thereof;

a substantially U-shaped support member extending generally perpendicular from the support mast and generally parallel to the elongate support member, the U-shaped support member being disposed between the hitch attachment bar and the elongate support member, and the U-shaped member being positioned and configured to stabilize a rear wheel of the bicycle by functioning as a wheel chock to prevent the rear wheel from riding over the U-shaped support; and

a cradle disposed along the elongate support member, the cradle including a base and four rods extending from the base, each of the rods having a free distal end and each of the rods extending away from the elongate support member towards the distal end of the rods, a first and a second of the rods extending generally parallel to one another, a third and a fourth of the rods each having a portion extending non-parallel to the base and a further portion extending as an arm towards the distal end of said each third and fourth of the rods, the first and second of the rods being spaced-apart from the arms of the third and fourth of the rods so as to allow the crown fork to be received by the cradle, whereby the first and second of the rods are disposed between fork tubes of the bicycle and a head tube of the bicycle is disposed between said arms of the third and fourth of the rods.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,959,047 B2
APPLICATION NO. : 11/453095
DATED : June 14, 2011
INVENTOR(S) : Malcolm Hammond

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 4, line 43 - Column 5, line 6,
Claim 1 should be amended as shown below. In the issued patent the "," on the fourth last line of claim 1 as shown below between "said rods, the second pair" is missing.

1. A bicycle carrier for receiving a fork crown of a bicycle, the bicycle carrier comprising:

a support mast;

a hitch attachment bar extending generally perpendicular from the support mast adjacent a first end thereof;

an elongate support member extending generally perpendicular from the support mast adjacent a second end thereof;

a substantially U-shaped support member extending generally perpendicular from the support mast and generally parallel to the elongate support member, the U-shaped support member being disposed between the hitch attachment bar and the elongate support member, and the U-shaped member being positioned and configured to stabilize a rear wheel of the bicycle by functioning as a wheel chock to prevent the rear wheel from riding over the U-shaped support; and

a cradle disposed along the elongate support member, the cradle including four rods, wherein each of the rods extends away from the elongate support member and said each of the rods has a free distal end, a first pair of the rods forming a U-shape structure and a second pair of the rods forming a U-shaped base from which the rods thereof further extend angularly as arms towards the distal end of the said rods, the second pair of rods being connected to and extending from at least one rod of the first pair of rods so as to allow the fork crown to be received between the first pair of rods, whereby the first pair of rods is disposed between fork tubes of the bicycle and a head tube of the bicycle is disposed between the second pair of rods.

Signed and Sealed this
Sixteenth Day of August, 2011

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office